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THE BURNING QUALITY OF TOBACCO, WITH SUGGESTIONS FOR ITS IMPROVEMENT IN THE FLUE-CURED TYPES OF EASTERN NORTH CAROLINA AND SOUTH CAROLINA.

THE IMPORTANCE OF POTASH IN PRODUCING GOOD-BURNING QUALITY IN TOBACCO.

A large proportion of the tobacco produced in the new belt section of eastern North Carolina and South Carolina is exported. Numerous complaints, generally originating abroad, have come to the notice of the Office of Tobacco Investigations concerning the defective burn of these new belt types, and it has been stated that there is a tendency to discriminate abroad against tobacco from these districts because of this defect.

The importance of a liberal supply of potash in forms free from chlorin in assuring a good burning tobacco is generally recognized by investigators. A good burning tobacco generally contains sufficient potash to combine not only with the inorganic acids, particularly sulphuric, hydrochloric, and nitric, but a surplus also for uniting with the weaker organic acids, particularly malic and citric. The burning quality depends on such surplus of potash in organic combination above the quantity united with the inorganic acids, and the increasing of this surplus will even overcome the effects of deleterious substances present, such as chlorin.

Two factors at once suggest themselves as important contributing causes for the poor burn of new belt tobacco:

(1) The sandy character of the soil, usually indicating rather a low available potash supply.

(2) The fact that tobacco is frequently planted on soil that has been in cotton or other crops, fertilized, perhaps, liberally with materials containing large quantities of chlorin, particularly muriate (chlorid) of potash or kainit, and the residual of chlorin left over and accumulating in the soil may be absorbed by the tobacco to the detriment of its burning quality. Sometimes, indeed, kainit or the

muriate of potash have been used directly in the tobacco fertilizer. This of course should not be done. The chlorin contained in these forms does more harm to the burn than the potash does good.

Among the desirable sources of potash available at a reasonable price the high-grade sulphate of potash, analyzing 48 to 50 per cent of actual potash, seems best. Potash from this source is about as cheap as in the form of kainit, and based upon an application of 150 pounds of sulphate to the acre will cost less than 50 cents an acre more than the same quantity of potash in the form of muriate. In increasing the yield the sulphate is fully as effective as either the muriate of potash or kainit.

At least 75 pounds of actual potash is required to produce the root, stalk, and leaves of a 1,000-pound crop of tobacco. It is not unreasonable to expect this yield from an acre of land. In view of the effect desired in improving the burning quality of the tobacco, there should probably be applied at least this quantity of potash to each acre of land planted in tobacco in the new belt section. This is equivalent to an application of 150 pounds of sulphate of potash per acre.

The ordinary fertilizer as now used, say, 800 pounds per acre of the 3–8–3 or 3–8–4 formula, contains only about half or less of this quantity of potash, or the equivalent of from 50 to 60 pounds of sulphate of potash per acre. With such an application, more than half of the required potash for a 1,000-pound crop must be drawn from the soil's natural supply. Apparently this is not generally obtained from the sandy new belt soils in such liberal excess as to make the burn of the tobacco what it should be. Supplementing the ordinary quantity of fertilizer used (say 800 pounds of the 3–8–3 formula, which will supply 24 pounds of potash) with 100 pounds of sulphate of potash (50 per cent actual potash) containing 50 pounds of potash, will bring up the per-acre application of potash to about the 75 pounds desired. This will about satisfy the demands of a 1,000-pound crop, and the soil's natural supply can be regarded as a surplus for good measure, better assuring the high potash content in the leaf necessary to a good burning tobacco. In the cigar-tobacco sections of the Connecticut Valley, where a good burn is necessary for the success of the industry, from 200 to 300 pounds of sulphate of potash per acre are generally used.

POTASH TENDS TO INCREASE THE YIELD AND OTHERWISE IMPROVE THE QUALITY OF TOBACCO.

Aside from its favorable effect on the burn of tobacco, better assuring by its liberal use a good reputation in this regard, potash may be expected also to increase the yield and improve the quality sufficiently in the new belt section to render liberal applications profitable.

The Office of Tobacco Investigations has recently been conducting a number of series of experiments with fertilizers on the flue-cured types, as well as other types of tobacco, some of them in the new belt section. In comparing the results of these trials on bright tobacco, using a complete fertilizer containing a liberal quantity of potash and one without potash, there has usually been an increase in yield of about 200 pounds of tobacco per acre, where the potash was used liberally, and the quality has improved generally in body, soundness, and color, so as to make it worth from 1 cent to 2 cents more per pound.

Generalizing, in the form of a concrete illustration based upon the experiments conducted, the addition of 100 pounds of sulphate of potash per acre to the quantity generally contained in the complete fertilizer used might reasonably be expected to increase the yield from 50 to 100 pounds per acre and the value from one-half cent to 1 cent a pound. Based on a yield of 750 pounds of tobacco per acre and an average price of 9½ cents without the added potash, this would mean an increase in value of the crop of $7.75 per acre, using the minimum figures for the expected increase in yield and price estimated above. The cost of the 100 pounds of sulphate of potash used would be from $2.50 to $3. This gain is entirely independent of the effect resulting from the use of potash in improving the burning quality of the leaf produced.

To summarize: An increased use of potash on tobacco in the new belt sections of eastern North Carolina and South Carolina may be expected to prove profitable because it should increase the yield and improve the quality in respect to body, soundness, color, and burning quality.

SUGGESTIONS AS TO FERTILIZER FORMULAS FOR TOBACCO.

The end of merely increasing the application of potash (K_2O) from the 25 or 30 pounds per acre usually made by the use of 800 or 1,000 pounds of 3–8–3 or 3–8–4 fertilizer could of course be accomplished approximately by applying 750 pounds of fertilizer analyzing 3–8–10 (10 of potash) or 1,000 pounds per acre of a fertilizer analyzing 3–8–7½.

The ammonia (3 per cent, often and perhaps better spoken of in terms of nitrogen) contained in fertilizers made according to these formulas would in one case be 24 pounds and in the other 30 pounds per acre. These amounts are in either case considerably less than half the quantity actually required to produce a 1,000-pound crop of tobacco per acre. The remainder (40 to 50 pounds) must come from the soil itself, in decaying vegetable matter or manure, or a 1,000-pound crop can not be produced. Many, perhaps the majority, of bright tobacco soils, fail to produce the full yield (without impairment of quality) which they might because of an insufficient

supply of ammonia. Except in soils of considerable natural improvement, indicated by good yields and a tendency of the tobacco to cure too red or dark, the application of ammonia could often be increased to 40 or 50 pounds per acre with decided profit.

On this basis, the following formula, which it is believed will be suitable for use on an acre of land on a majority of the tobacco soils of the new belt section is recommended:

250 pounds of dried blood (16 per cent ammonia).
400 pounds of 16 per cent acid phosphate.
150 pounds of sulphate of potash (50 per cent potash).

800 pounds.

These materials should be thoroughly mixed together with a shovel. They supply 40 pounds of ammonia (NH_3), 64 pounds of phosphoric acid (P_2O_5), and 75 pounds of potash (K_2O). This is 16 pounds more of ammonia than are contained in 800 pounds of 3–8–3 fertilizer, the same quantity of phosphoric acid, and 51 pounds more of potash. Blood is suggested as a satisfactory source of ammonia. Cottonseed meal is also good, and 500 pounds of cottonseed meal analyzing 8 per cent of ammonia could be substituted for the blood in many cases without deteriorating the formula except in necessitating the handling of a greater bulk of material to get the same plant food. Sometimes, however, on the stiffer types of soil the cottonseed meal by its slowness in becoming available might prolong the growth so that the tobacco would not yellow down properly. The cost of this formula for an acre, using the blood, would be about $14 or $15.

For those who desire a formula making no change in the ammonia or phosphoric acid but increasing the potash, as suggested, the following should be found satisfactory for an acre of land, the gain being in the bulk of materials used and the saving in cost:

150 pounds of dried blood (16 per cent ammonia).
400 pounds of 16 per cent acid phosphate.
150 pounds of sulphate of potash (50 per cent potash).

700 pounds.

This formula contains the same amount of plant food as 800 pounds of 3–8–10 fertilizer, but its analysis is about 4–10–12. Its cost for the 700 pounds would be from $11 to $12. The expense of mixing these materials on the ground or barn floor is almost negligible.

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